

Amendments to the Claims

For the Examiner's convenience, this Amendment & Request for Reconsideration includes the text of all claims under examination. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. Canceled.

2. (Currently amended): ~~An photoelectric conversion~~imaging apparatus comprising:

a two-dimensional sensor having a plurality of pixels two-dimensionally arranged on a substrate and a signal line on said substrate, ~~in the form of a matrix~~, each pixel having formed from a combination of a photoelectric conversion element which converts radiation or visible light into an electrical signal ~~and generating electric charge~~ and a transfer device for transferring the electrical signal charge generated by the photoelectric conversion element to said signal line;

a first read unit, which is connected to said signal line, for amplifying and reading the electrical signal charge transferred to said signal line by the transfer device; and

a phototimer detection unit, which is arranged on said substrate, for detecting the radiation or visible light and generating a detected signal and transferring the detected signal to said signal line to control exposure of the radiation or visible light; and

a second read unit, which is connected to said signal line, for reading the detected signal detected by said phototimer detection unit from said signal line;

~~wherein a common path is used both as a signal transmission path which connects the transfer device to the read unit and a signal transfer path of said phototimer detection unit.~~

3. (Currently amended): The apparatus according to claim 21, wherein one or a plurality of phototimer detection unit each identical to said phototimer detection unit are provided in the same place as that of said ~~on the signal line~~ transmission path ~~which connects the transfer device to the read unit.~~

4. (Currently amended): The apparatus according to claim 21, wherein said phototimer detection unit is manufactured by substantially the same manufacturing process as that for the photoelectric conversion element or the transfer device.

5. (Currently amended): The apparatus according to claim 21, wherein

said photoelectric conversion element has, on an insulating substrate,

a first electrode layer,

a first insulating layer,

a photoelectric conversion semiconductor layer formed from a non-single crystal semiconductor,

a second electrode layer,

an injection blocking layer which is formed between the second electrode layer and the photoelectric conversion semiconductor layer and blocks injection of carriers having a first conductivity type into the photoelectric conversion semiconductor layer, and

a third electrode layer made of a metal, and

the second electrode layer is formed on the injection blocking layer and is transparent to visible light.

6. (Currently amended): The apparatus according to claim 21, wherein the photoelectric conversion element includes

- an insulating substrate,
- a first electrode layer formed on the insulating substrate,
- a first insulating layer formed on the first electrode layer,
- a photoelectric conversion semiconductor layer formed on the first insulating layer by using a non-single crystal semiconductor,
- an injection blocking layer which is formed on the photoelectric conversion semiconductor layer and blocks injection of carriers having a first conductivity type into the photoelectric conversion semiconductor layer,
- a second electrode layer which is formed on the injection blocking layer and transparent to visible light, and
- a third electrode layer formed between the second electrode layer and the photoelectric conversion semiconductor layer by using a metal.

7. (Currently amended): The apparatus according to claim 21, wherein the photoelectric conversion element includes, on an insulating substrate,

- a first electrode layer,
- a first injection blocking layer which blocks injection of electric charge having a first conductivity type,
- a photoelectric conversion semiconductor layer made of an amorphous semiconductor,
- a second injection blocking layer which blocks injection of electric charge having a second conductivity type different in sign from the electric charge of the first conductivity type,

a second electrode layer which is formed on the second injection blocking layer and transparent to visible light, and

a third electrode layer made of a metal.

8. (Currently amended): The apparatus according to claim 21, wherein the photoelectric conversion element includes

an insulating substrate,

a first electrode layer formed on the insulating substrate;

a first injection blocking layer which is formed on the first electrode layer and blocks injection of carriers having a first conductivity type,

a photoelectric conversion semiconductor layer formed on the first injection blocking layer by using a non-single semiconductor,

a second injection blocking layer which is formed on the photoelectric conversion semiconductor layer and blocks injection of carriers having a second conductivity type different in sign from the carriers of the first conductivity type,

a second electrode layer which is formed on the second injection blocking layer and transparent to visible light, and

a third electrode which is formed between the second electrode layer and the second injection blocking layer by using a metal.

9. (Currently amended): An X-ray imaging apparatus comprising:

~~an photoelectric conversion~~imaging apparatus ~~defined in claim 1;~~ and

a phosphor which is arranged~~bonded~~ on a light-receiving surface of said ~~photoelectric conversion~~imaging apparatus,

wherein

said imaging apparatus comprising:

a two-dimensional sensor having a plurality of pixels two-dimensionally arranged on a substrate and a signal line on said substrate, each pixel having a photoelectric conversion element which converts radiation or visible light into an electrical signal and a transfer device for transferring the electrical signal generated by the photoelectric conversion element to said signal line;

a first read unit, which is connected to said signal line, for amplifying and reading the electrical signal transferred to said signal line by the transfer device;

a phototimer detection unit, which is arranged on said substrate, for detecting the radiation or visible light and generating a detected signal and transferring the detected signal to said signal line to control exposure of the radiation or visible light; and

a second read unit, which is connected to said signal line, for reading the detected signal detected by said phototimer detection unit from said signal line,

wherein said phosphor converts X-rays into visible light.

10. (Currently amended): ~~The~~An X-ray imaging apparatus according to claim 9, further comprising:

~~———— a photoelectric conversion apparatus defined in claim 1;~~

~~———— an electrical signal read unit for reading an electrical signal on the basis of X-rays detected by said phototimer detection unit of said photoelectric conversion apparatus; and~~

an exposure control unit for determining an exposure from an electrical signal based on the detected electrical signal read by said ~~second~~electrical signal read unit, and controls an X-ray source to obtain an image having an optimal contrast.

11. Canceled.

12. (New): An imaging apparatus, comprising:

a two-dimensional sensor having a plurality of pixels two-dimensionally arranged on a substrate and a signal line on said substrate, each pixel having a photoelectric conversion element which converts radiation or visible light into an electrical signal and a transfer device for transferring the electrical signal generated by the photoelectric conversion element to said signal line;

a read unit, which is connected to said signal line, for amplifying and reading the electrical signal transferred to said signal line by the transfer device;

a phototimer detection unit, which is arranged on said substrate, for detecting the radiation or visible light and generating a detected signal and transferring the detected signal to said signal line to control exposure of the radiation or visible light; and

wherein said phototimer detection unit is arranged in the same place as that of said signal line.

13. (New): The apparatus according to claim 12, further comprising a second read unit for reading electrical signal from said phototimer detection unit, wherein said second read unit is connected to said signal line.

14. (New): The apparatus according to claim 12, wherein said signal line includes a transparent electrode, which is transparent to visible light, on an area in which said phototimer detection unit is arranged.